

Appln. No 10/018,131
Amendment dated July 6, 2004
Reply to Office Action dated March 10, 2004

Amendments to the Claims

The following Listing of Claims will replace all prior versions of claims in the application:

Listing of Claims

Claim 1 (cancelled)

Claim 2 (cancelled)

Claim 3 (cancelled)

Claim 4 (cancelled)

Claim 5 (cancelled)

Claim 6 (cancelled)

Claim 7 (cancelled)

Claim 8 (cancelled)

Claim 9 (cancelled)

Claim 10 (cancelled)

Claim 11 (cancelled)

Claim 12 (cancelled)

Claim 13 (cancelled)

Claim 14 (cancelled)

Claim 15 (cancelled)

Claim 16 (cancelled)

Claim + 17 (currently amended): An apparatus for recording a thermo-optical image of a female breast on a thermo-optical foil comprising:

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a casing having a non-opaque side, said non-opaque side being positioned to face a location for the breast when the thermooptical image is recorded;

a thermooptical foil for producing a thermooptical image of the breast having at least first and second surfaces and being positioned between said casing and the location for the breast, said first surface of said thermooptical foil facing said non-opaque side of said casing, said second surface of said thermooptical foil being positioned to contact the breast;

a transparent cooling apparatus which can contact and cool said thermooptical foil to a constant temperature for a presettable amount of time when said thermooptical foil is in contact with the breast; and a camera mounted to record from within said casing the thermooptical image of the foil against the breast at the end of the presettable amount of time.

Claim 18 (previously added): The apparatus for recording a thermooptical image of a female breast of claim 17 further comprising an illuminating system for illuminating said thermooptical foil within said casing.

Claim 19 (previously added): The apparatus for recording a thermooptical image of a female breast of claim 17, said cooling apparatus being configured to cool said thermooptical foil to a constant temperature to allow for standardized and reproducible recording conditions.

Claim 20 (previously added): An apparatus for recording a thermooptical image of a female breast comprising:

a casing having at least one opaque side and a non-opaque side, said non-opaque side being positioned to face a location for the breast when the image is recorded;

a thermooptical foil for producing a thermooptical image of the breast having at least first and second surfaces and being positioned on a frame located between said casing and the

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location for the breast, said first surface of said thermooptical foil facing said non-opaque side of said casing, said second surface of said thermooptical foil being positioned to contact the breast;

a cooling box mounted adjacent said first surface of said thermooptical foil for cooling said thermooptical foil to a standard temperature at a time when said thermooptical foil contacts the breast;

a timer for measuring a presettable amount of time that passes after said thermooptical foil begins to be cooled by said cooling box;

an illuminating system for illuminating said thermooptical foil within said casing; and

a digital camera positioned to record the thermooptical image of the breast on said thermooptical foil from within said casing after the presettable amount of time passes.

Claim 21 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a cooling medium circuit for providing a cooling medium to effect cooling of said cooling box, said cooling medium circuit comprising:

a cooling medium inlet for supplying said cooling medium to said cooling box;

a cooling medium outlet for removing said cooling medium from said cooling box; and

a thermostat for measuring the amount of cooling performed by said cooling medium circuit, said thermostat being responsive with respect to the temperature of said cooling medium.

Claim 22 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising an antireflection disk positioned between said thermooptical foil and said digital camera.

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Claim 23 (previously added): The apparatus for recording a thermooptical image of claim 20, said thermooptical foil having a relaxed position, said thermooptical foil does not come into contact with said cooling box when in the relaxed position.

Claim 24 (previously added): The apparatus for recording a thermooptical image of claim 20, said frame having a relaxed position and being springingly connected to said casing with at least one mounting device, each said at least one mounting device comprising:

a steel pin extending from said frame to said casing; and

a spring having an unloaded condition and an unloaded length and being inverted over said steel pin, said spring extending from said frame to said casing, wherein said spring assumes said unloaded length when assuming said unloaded condition, said unloaded length of said spring being sufficient to maintain a spacial clearance between said cooling box and said thermooptical foil.

Claim 25 (previously added): The apparatus for recording a thermooptical image of claim 24, compression of each said spring permits said frame to assume a non-relaxed position and further permits contact between said thermooptical foil and said cooling box.

Claim 26 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a clamping device having a pad for pressing the breast against said thermooptical foil.

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Claim 27 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a clamping device for clamping the breast against said thermooptical foil, said clamping device comprising:

a pad for pressing the breast against said thermooptical foil; and

a mounting support for providing support for said pad and for providing pressure for said pad against said breast.

Claim 28 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a clamping device comprising:

a pad for pressing the breast against said thermooptical foil; and

a mounting support connected to said casing, said mounting support extending parallel to said frame for providing support for said pad, the spacing between said pad and said thermooptical foil being variable.

Claim 29 (previously added): The apparatus for recording a thermooptical image of claim 20 having a clamping device comprising:

a pad for pressing the breast against said thermooptical foil, said pad having a major planar pressing surface; and

a mounting support having a major horizontal dimension and being connected to said casing, said mounting support providing support for said pad, the spacing between said pad and said thermooptical foil being variable, said major planar pressing surface of said pad positioned at about a right angle to said major horizontal dimension of said mounting support.

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Claim 30 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising:

said frame having a relaxed position, a substantially quadrangular shape, first, second, third and fourth corners, and being springingly connected to said casing with one steel pin in each said corner of said frame, each said steel pin extending from said frame to said casing;

each said steel pin having a spring, each said spring having an unloaded condition and an unloaded length and being inverted over said pin, each said spring extending from said frame to said casing wherein said spring assumes said unloaded length when assuming said unloaded condition, said unloaded length of said spring being sufficient to maintain a spacial clearance between said cooling box and said thermooptical foil.

Claim 31 (previously added): The apparatus for recording a thermooptical image of claim 30, compression of said springs permits said frame to assume a non-relaxed position and further permits contact between said thermooptical foil and said cooling box.

Claim 32 (previously added): The apparatus for recording a thermooptical image of claim 20, said casing being positioned on a multi-articulation arm to permit variable positioning of said casing.

Claim 33 (previously added): The apparatus for recording a thermooptical image of claim 20, said casing being positioned on a multi-articulation arm mounted on an instrument trolley to permit variable positioning of said casing with respect to said instrument trolley.

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Claim 34 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a monitor screen connected to said digital camera for monitoring images recorded with said digital camera.

Claim 35 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a computer for processing images collected with said digital camera.

Claim 36 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a computer for operating said apparatus and for processing information collected with said digital camera.

Claim 37 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising an information storage medium for storing digital images recorded with said digital camera.

Claim 38 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising printer output device for producing digital images recorded with said digital camera in a printed format.

Claim 39 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising an image evaluating device connected to said digital camera for automatic evaluation of information contained in images recorded with said digital camera in response to pathological changes.

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Claim 40 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising an image evaluating device connected to said digital camera for comparing information contained in images recorded with said digital camera to reference images.

Claim 41 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising an image evaluating device connected to said digital camera for comparing an image recorded by said digital camera for structures or features characteristic of mammary carcinomas.

Claim 42 (previously added): The apparatus for recording a thermooptical image of claim 20 further comprising a monitor screen, said monitor screen being subdivided into first and second windows, said first window configured to display the image recorded by said digital camera, said second image configured to display a reference image for comparison to said first window.

Claim 43 (previously added): An apparatus for recording a thermooptical image of a female breast comprising:

a casing having at least one opaque side and a non-opaque side, said non-opaque side being positioned to face a location for the breast when the image is recorded;

a thermooptical foil for producing a thermooptical image of the breast having at least first and second surfaces and being positioned on a frame located between said casing and the location for the breast, said first surface of said thermooptical foil facing said non-opaque side

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of said casing, said second surface of said thermooptical foil being positioned to contact the breast;

said frame having a relaxed position, a substantially quadrangular shape, first, second, third and fourth corners, and being springingly connected to said casing with one steel pin in each said corner of said frame, each said steel pin extending from said frame to said casing and having a spring, each said spring having an unloaded condition and an unloaded length and being inverted over said pin, each said spring extending from said frame to said casing wherein said spring assumes said unloaded length

when assuming said unloaded condition, said unloaded length of said spring being sufficient to maintain a spatial clearance between said cooling box and said thermooptical foil, compression of said springs permits said frame to assume a nonrelaxed position and further permits contact between said thermooptical foil and said cooling box;

a clamping device for clamping the breast against said thermooptical foil, said clamping device having a pad for pressing the breast against said thermooptical foil and a mounting support for providing support for said pad and for providing pressure for said pad against said breast;

a cooling box mounted adjacent said first surface of said thermooptical foil for cooling said thermooptical foil to a standard temperature at a time when said thermooptical foil contacts the breast;

a cooling medium circuit for providing a cooling medium to effect cooling of said cooling box, said cooling medium circuit having a cooling medium inlet for supplying said cooling medium to said cooling box, a cooling medium outlet for removing said cooling medium from said cooling box, and a thermostat for measuring the amount of cooling

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performed by said cooling medium circuit, said thermostat being responsive to the temperature of said cooling medium:

a timer for measuring a presettable amount of time that passes after said thermooptical foil begins to be cooled by said cooling box;

an illuminating system for illuminating said thermooptical foil within said casing; and

a digital camera positioned to record the thermooptical image of the breast on said thermooptical foil from within said casing after the presettable amount of time passes; and

an antireflection disk positioned between said thermooptical foil and said digital camera.

Claim 44 (previously added): An apparatus for recording a thermooptical image of a female breast comprising:

a casing having at least one opaque side and a non-opaque side, said non-opaque side being positioned to face a location for the breast when the image is recorded, said casing being positioned on a multi-articulation arm mounted on an instrument trolley to permit variable positioning of said casing with respect to said instrument trolley;

a thermooptical foil for producing a thermooptical image of the breast having at least first and second surfaces and being positioned on a frame located between said casing and the location for the breast, said first surface of said thermooptical foil facing said non-opaque side of said casing, said second surface of said thermooptical foil being positioned to contact the breast;

said frame having a relaxed position, a substantially quadrangular shape, first, second, third and fourth corners, and being springingly connected to said casing with one steel pin in

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each said corner of said frame, each said steel pin extending from said frame to said casing and having a spring, each said spring having an unloaded condition and an unloaded length and being inverted over said pin, each said spring extending from said frame to said casing wherein said spring assumes said unloaded length when assuming said unloaded condition, said unloaded length of said spring being sufficient to maintain a spacial clearance between said cooling box and said thermooptical foil, compression of said springs permits said frame to assume a nonrelaxed position and further permits contact between said thermooptical foil and said cooling box;

a clamping device for clamping the breast against said thermooptical foil, said clamping device having a pad for pressing the breast against said thermooptical foil and a mounting support for providing support for said pad and for providing pressure for said pad against said breast;

a cooling box mounted adjacent said first surface of said thermooptical foil for cooling said thermooptical foil to a standard temperature at a time when said thermooptical foil contacts the breast;

a cooling medium circuit for providing a cooling medium to effect cooling of said cooling box, said cooling medium circuit having a cooling medium inlet for supplying said cooling medium to said cooling box, a cooling medium outlet for removing said cooling medium from said cooling box, and a thermostat for measuring the amount of cooling performed by said cooling medium circuit, said thermostat being responsive to the temperature of said cooling medium;

a timer for measuring a presettable amount of time that passes after said thermooptical foil begins to be cooled by said cooling box;

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an illuminating system for illuminating said thermooptical foil within said casing; and
a digital camera positioned to record the thermooptical image of the breast on said thermooptical foil from within said casing after the presettable amount of time passes;
an antireflection disk positioned between said thermooptical foil and said digital camera;
a monitor screen connected to said digital camera for monitoring images recorded with said digital camera; and
a computer for operating said apparatus and for processing information collected with said digital camera.

Claim 45 (previously added): A method of recording a thermooptical image of a female breast on a thermooptical foil comprising: positioning the thermooptical foil against a breast;
cooling the thermooptical foil to a constant temperature for a presettable amount of time while the thermooptical foil is against the breast; and
recording a thermooptical image of the foil against the breast at the end of the presettable amount of time.

Claim 46 (previously added): The method of claim 45 which includes recording the thermooptical image from within a casing which is opaque except for a side facing the thermooptical foil and illuminating the thermooptical foil at the time of recording the thermooptical image.

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Claim 47 (previously added) The method of claim 45 in which the thermooptical image recorded is examined for pathological changes in the breast.

Claim 48 (previously added) The method of claim 45 in which the thermooptical image recorded is compared to a previously recorded thermooptical image for comparison and evaluation of pathological changes.